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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/683,114	11/20/2001	John E. Davis	08CN8803-25	9349

23413 7590 05/28/2002

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EXAMINER	
BERNATZ, KEVIN M	

ART UNIT	PAPER NUMBER
1773	4

DATE MAILED: 05/28/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Applicati n No.	Applicant(s)	
	09/683,114	DAVIS ET AL.	
	Examin r	Art Unit	
	Kevin M Bernatz	1773	

-- The MAILING DATE of this communication appears n the c ver sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11 and 13-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11 and 13-33* is/are rejected.

7)☒ Claim(s) *16,30,32 and 33* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a)☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *1,2* .
4) ☒ Interview Summary (PTO-413) Paper No(s). *1* .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. Preliminary amendments to claims 1, 5, 6, 9, 12, 13 and 18 - 33, filed on March 20, 2002, have been entered in the above-identified application.

Claim Objections

2. Claim 16 is objected to because of the following informalities: lines 2 – 3: insert "is" between "resin" and "at least partially cured". Appropriate correction is required.

Claim 30 is objected to because of the following informalities: replace the comma after "electric field" with "or".

Claims 32 and 33 are objected to because of the following informalities: replace "a optical" with "an optical".

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1 – 11 and 13 – 33 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a storage ***disk***, does not reasonably provide enablement for a storage tape or ribbon. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to

make or use the invention commensurate in scope with these claims. For example, note the claims that are directed to a "radial tilt", which is clearly only present in disk shaped storage media. Amendment to change "A storage media for data" to "A storage disk media for data" would overcome this rejection.

Claims 1 – 11 and 13 – 33 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. The tilt and axial displacement are critical or essential properties of the invention, but are not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). Specifically, applicants have not recited the test method used to measure these properties and the examiner does not deem them to be art recognized. For purposes of evaluating the prior art, the examiner has interpreted tilt and axial displacement in a similar manner as recited in IDS reference Sandstrom (U.S. Patent No. 5,972,461), where they are simply a measure of the warp of a disk (col. 3, lines 5- 18; col. 3, line 64 bridging col. 4, line 14; col. 5, lines 13 – 14; and Figure 4 – where Figure 4 shows axial displacement vs. disk thickness and Sandstrom discloses Figure 4 as "a graph illustrating variations in deflection for disks having different substrate thicknesses", hence implying that axial displacement is simply another word for deflection).

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1 – 11 and 13 – 33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 1, 20, 21 and 31 - 33, the phrase "less than about 10 Å" renders the claim(s) indefinite because the metes and bounds are ill defined. The phrase "less than X", meaning any value less than X, excluding X, is well defined if X is well defined. If X is not well defined, then the phrase is indefinite because it is unclear which values are to be excluded from the range. Deleting the word(s) "about" from the claim(s) is sufficient to overcome this rejection and would limit the range to values less than 10 Å.

Regarding claims 2 – 4, 10 and 11, the phrase "at least about" renders the claim(s) indefinite because the metes and bounds are ill defined. The phrase "at least X", meaning any value greater than X, including X, is well defined if X is well defined. If X is not well defined, then the phrase is indefinite because it is unclear which values are to be excluded from the range. Deleting the word(s) "about" from the claim(s) is sufficient to overcome this rejection.

The term "rigid" in claims 1, 8 and 32 is a relative term which renders the claim indefinite. The term "rigid" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. While the examiner

notes that "rigid" and "floppy" are used to describe recording media, the difference between the two terms is arbitrary and is therefor indefinite (e.g. Polycarbonate or NiP plated aluminum can be rigid or flexible depending on the thickness). Removal of the term "rigid" from these claims would be sufficient to overcome this rejection.

Claims 1 – 11, 13 – 18, 21 – 30, 32 and 33 recite limitations that require the storage media to be a disk ("radial tilt" or "rotating"), yet there is no antecedent basis for the a disk-shaped media. See also Paragraph 4, above.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claim 30 is rejected under 35 U.S.C. 102(b) as anticipated by ***or, in the alternative***, under 35 U.S.C. 103(a) as obvious over IDS reference Tanabe et al. (U.S. Patent No. 5,447,767).

Regarding claim 30, the claimed invention reads on Tanabe et al. as follows: Tanabe et al. disclose a storage media for data, said media comprising: a metal substrate (col. 8, lines 13 - 18), a plastic film (col. 9, lines 16 – 42 and lines 57 – 63; col. 9, line 67 bridging col. 10, line 19; and Figures 2F and 4F), and a data layer disposed on said plastic film, wherein said data layer can be at least partly read from, written to, or a combination thereof by at least one energy field, wherein said energy field comprises at least one of an electric field or a magnetic field (col. 6, lines 54 – 62; col. 22, lines 13 – 20; and Figure 1A).

It has been held that where claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established and the burden of proof is shifted to applicant to show that prior art products do not necessarily on inherently possess characteristics of claimed products where the rejection is based on inherency under 35 USC 102 or on *prima facie* obviousness under 35 USC 103, jointly or alternatively. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). "When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not." *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). Therefore, the *prime facie* case can be

rebutted by ***evidence*** showing that the prior art products do not necessarily possess the characteristics of the claimed product. *In re Best*, 562 F.2d at 1255, 195 USPQ at 433.

Therefor, in addition to the above disclosed limitations, the presently claimed property of the tilt measured in the resting state would have obviously been present because the prior art product is substantially identical in structure, and there is no evidence of record showing that the disclosed prior art products do not necessarily possess the characteristics of the claimed product.

10. Claims 1 – 9, 15 – 18, 20 – 22, 24 – 26, 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanabe et al. ('767) in view of IDS reference Nakayama et al. (U.S. Patent No. 4,673,602), IDS reference Annacone et al. (U.S. Patent No. 6,194,045 B1) and IDS reference Sandstrom (U.S. Patent No. 5,972,461). Regarding independent claims 1, 20, 32 and 33, Tanabe et al. disclose the claimed invention as described above. Tanabe et al. further disclose glass substrates (col. 9, lines 50 – 56 and col. 12, lines 29 – 36) patterning the plastic film with geographic locators (col. 1, lines 52 – 62; col. 9, lines 57 – 63; and Figure 2F) and a film thickness meeting applicants' claimed limitations (col. 19, lines 38 – 48). The examiner has deemed that any patterned shape is inherently a "geographic locator" since it forms a pattern on the substrate which can be read either visually or mechanically. In addition, the limitation "embossed" is a product-by-process limitation and is given little or no weight in terms of evaluating the prior art since it is not further limiting in so far as the structure of the product is concerned. "[E]ven though product-by-process claims are

limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP § 2113.

Tanabe et al. fail to disclose a magnetic layer on the substrate.

However, Nakayama et al. teach that composite substrates for both magnetic and optical recording are equivalent in the art (Title and col. 2, lines 9 – 15).

Substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. In the instant case, a magnetic data layer and optical data layer are equivalents in the field of data layers formed on composite substrates. *In re Fount* 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950).

Neither Tanabe et al. nor Nakayama et al. disclose the tilt or the axial displacement of the substrate.

However, Sandstrom teaches that both tilt and axial displacement are undesired in a recording medium and that substrates possessing high flatness are known to be desired in the recording industry to allow for high density near field recording systems (col. 3, lines 5 – 18; col. 3, line 64 bridging col. 4, line 14; and Figures 3 and 4).

Therefor, in addition to the above disclosed limitations, the presently claimed property of the tilt measured in the resting state would have obviously been present because the prior art product is substantially identical in structure, and there is no evidence of record showing that the disclosed prior art products do not necessarily possess the characteristics of the claimed product and it is known in the art to minimize the axial displacement and tilt as taught by Sandstrom inorder to allow for high density near field recording.

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Tanabe et al. in view of Nakayama et al., if not already inherently possessing said limitations, to possess a tilt and axial displacement meeting applicants' claimed limitations as taught by Sandstrom inorder to allow for high density near field recording.

None of the above disclose controlling the surface roughness of the substrate to within applicants' claimed limitation.

However, Annacone et al. teach that substrates for recording media are required to have a very smooth surface finish of less than 10 Å inorder to allow extremely low flying heights and increased recording density (col. 3, lines 30 – 49 and col. 4, lines 42 – 46).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Tanabe et al. in view of Sandstrom and Nakayama et al. to have a surface roughness meeting applicants' claimed

limitations as taught by Annacone et al. inorder to allow extremely low flying heights and increased recording density.

Regarding claims 2 – 5 and 8, Tanabe et al. disclose substrates inherently meeting applicants' claimed limitations (e.g. ceramic and glass substrates) (col. 8, lines 13 – 18 and col. 12, lines 29 - 36).

Regarding claim 6 and 7, Tanabe et al. disclose embossing the plastic film with surface features meeting applicants' claimed limitations (col. 9, lines 57 – 63 and Figure 2F).

Regarding claim 9, in addition to the above disclosed limitations, the presently claimed property of relative head slap would have obviously been present because the prior art product is substantially the same structure, and there is no evidence of record showing that the disclosed prior art products do not necessarily possess the characteristics of the claimed product.

Regarding claim 14, Tanabe et al. disclose thermoplastic resins as suitable plastics (col. 19, line 63 bridging col. 20, line 6) and teach that materials having similar curing methods as the substrate (col. 12, line 67 bridging col. 13, line 15), as well as similar refractive index values (col. 9, lines 50 – 56) are preferred. It is therefor deemed obvious to one of ordinary skill in the art to use plastic layers which are thermoplastics disclosed as suitable for the base substrate (e.g. polycarbonate: col. 12, lines 29 – 36).

Regarding claims 15 - 17, Tanabe et al. disclose using thermosets as the coating layer meeting applicants' claimed limitations (col. 9, lines 16 – 42; col. 10, lines 43 – 47; and col. 20, lines 1 - 3). The limitation "at least partially ... resin" is a product-by-

process limitation and is given little or no weight in terms of evaluating the prior art for the reasons cited above.

Regarding claims 18 and 22, Tanabe et al. disclose thickness values meeting applicants' claimed limitations (col. 19, lines 38 – 48 and col. 26, lines 38 – 48).

Regarding claim 21, it would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to minimize the tilt of the substrate, if not already inherently possessing said limitation, to meet applicants' claimed limitations as taught by Sandstrom inorder to allow for high density near field recording.

Regarding claims 24 and 25, Tanabe et al. disclose film thickness values meeting applicants' claimed limitations (col. 19, lines 38 – 48).

Regarding claim 26, Tanabe et al. disclose surface features meeting applicants' claimed limitations (col. 9, lines 57 – 63 and Figure 2F). The examiner has deemed that any patterned shape is inherently a "geographic locator" since it forms a pattern on the substrate which can be read either visually or mechanically.

11. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanabe et al. ('767) in view of Nakayama et al. ('602), Annacone et al. ('045) and Sandstrom ('461) as applied above (this combination of references hereafter referred to as TNAS), and further in view of IDS reference Wu et al. (U.S. Patent No. 6,156,422).

TNAS disclose the claimed invention as described above.

TNAS fail to disclose a data layer meeting applicants' claimed limitations.

However, Wu et al. teach data layers meeting applicants' claimed limitations for use high areal recording density media (col. 1, lines 16 – 20 and Figures).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of TNAS to include a data layer meeting applicants' claimed limitations as taught by Wu et al. inorder to form a high areal recording density media.

12. Claims 13, 14 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over TNAS as applied above, and further in view of IDS reference Napoli et al. (U.S. Patent No. 4,731,155).

TNAS disclose the claimed invention as described above.

TNAS fail to disclose glass temperatures of the plastic film.

However, Nakayama et al. ('602) teach that the polymer film should have a glass temperature as high as possible inorder to have excellent mechanical and surface properties (col. 3, lines 15 – 34). Napoli et al. teach that typical embossing temperatures are up to 250 °C and beyond and that the polymer to be embossed must be capable of withstanding the processing temperatures (col. 2, lines 52 – 55). The higher the glass temperature of the polymer, the better the polymer will be able to withstand high temperature processing and enable increased molding cycle times.

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of TNAS to include a plastic film possessing a glass temperature meeting applicants' claimed limitations as taught by

Nakayama et al. and Napoli et al. inorder to produce a substrate capable of withstanding high processing temperatures as well as possessing excellent mechanical and surface properties.

13. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over TNAS as applied above, and further in view of IDS reference Lacotte et al. (U.S. Patent No. 4,659,407).

TNAS disclose the claimed invention as described above.

TNAS fail to disclose a double sided recording medium

However, Lacotte et al. teach that it is old in the art to make single or double sided media depending on the desired end use (i.e. for twice the recording density) (col. 1, line 29).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of TNAS to include a double sided recording media as taught by Lacotte et al. inorder to produce a medium possessing twice the recording density.

14. Claims 23, 27, 28 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over TNAS as applied above, and further in view of Oniki et al. (U.S. Patent No. 5,875,083).

TNAS disclose the claimed invention as described above.

TNAS fail to disclose overall media thickness values meeting applicants' claimed limitations (claims 23 and 31) and the depth of the patterned surface features meeting applicants' claimed limitations.

However, both the overall thickness values and the depth of the patterned surface features are cause-effective variables which can be optimized to control the physical (stiffness, mass, etc.) and mechanical (surface roughness, servo-tracking ability, etc.) properties of the substrate. Oniki et al. teach substrate thickness values fully encompassing applicants' claimed range for total medium thickness (col. 3, lines 63 – 67) and Oniki et al. also disclose depths meeting applicants' claimed limitations (Figure 8 and col. 6, lines 36 – 44 and lines 53 – 59).

It would have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the overall medium thickness and the depth of the patterned surface features through routine experimentation in the absence of a showing of criticality in the claimed overall medium thickness and embossed surface feature depth, especially given the teachings in Oniki et al. regarding the ranges useable for both variables. *In re Boesch*, 205 USPQ 215 (CCPA 1980), *In re Woodruff*, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

15. Claim 30 is rejected under 35 U.S.C. 102(b) as anticipated by ***or, in the alternative***, under 35 U.S.C. 103(a) as obvious over IDS reference Lewis et al. (U.S. Patent No. 4,363,844).

Regarding claim 30, the claimed invention reads on Lewis et al. as follows: Lewis et al. disclose a storage media for data, said media comprising: a metal substrate (col. 2, lines 36 – 40), a plastic film (i.e. the embossable layer), and a data layer disposed on said plastic film, wherein said data layer can be at least partly read from, written to, or a combination thereof by at least one energy field, wherein said energy field comprises at least one of an electric field or a magnetic field (col. 1, lines 6 – 15; col. 2, lines 50 – 65; and Figures).

In addition to the above disclosed limitations, the presently claimed property of the tilt measured in the resting state would have obviously been present because the prior art product is substantially identical in structure, and there is no evidence of record showing that the disclosed prior art products do not necessarily possess the characteristics of the claimed product.

16. Claims 1 – 9, 14 – 28 and 31 - 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lewis et al. ('767) in view of IDS reference Nakayama et al. ('602), IDS reference Annacone et al. ('045) and IDS reference Sandstrom ('461).

Regarding independent claims 1, 19, 20 and 31 - 33, Lewis et al. disclose the claimed invention as described above. Lewis et al. further disclose double sided recording media (col. 2, lines 22 – 67; col. 13, lines 26 – 42; claim 20 and Figures), embossing the plastic film with geographic locators (col. 2, lines 22 - 36 and Figures) and a film thickness meeting applicants' claimed limitations (col. 5, lines 31 - 36). The examiner has deemed that any embossed shape is inherently a "geographic locator"

since it forms a pattern on the substrate which can be read either visually or mechanically. While Lewis et al. fails to explicitly disclose glass substrates, Lewis et al. disclose art recognized equivalent substrates (e.g. metal, polymer and ceramic) (col. 2, lines 36 – 43) and it would have been within the knowledge of one of ordinary skill in the art to use glass substrates if transparency and low weight were desired.

Lewis et al. fail to disclose a magnetic layer on the substrate.

However, Nakayama et al. teach that composite substrates for both magnetic and optical recording are equivalent in the art (Title and col. 2, lines 9 – 15).

Substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. In the instant case, a magnetic data layer and optical data layer are equivalents in the field of data layers formed on composite substrates. *In re Fount* 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950).

Neither Lewis et al. nor Nakayama et al. disclose the tilt or the axial displacement of the substrate.

However, Sandstrom teaches that both tilt and axial displacement are undesired in a recording medium and that substrates possessing high flatness are known to be desired in the recording industry to allow for high density near field recording systems (col. 3, lines 5 – 18; col. 3, line 64 bridging col. 4, line 14; and Figures 3 and 4).

Therefor, in addition to the above disclosed limitations, the presently claimed property of the tilt measured in the resting state would have obviously been present

because the prior art product is substantially identical in structure, and there is no evidence of record showing that the disclosed prior art products do not necessarily possess the characteristics of the claimed product and it is known in the art to minimize the axial displacement and tilt as taught by Sandstrom inorder to allow for high density near field recording.

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Lewis et al. in view of Nakayama et al., if not already inherently possessing said limitations, to possess a tilt and axial displacement meeting applicants' claimed limitations as taught by Sandstrom inorder to allow for high density near field recording.

None of the above disclose controlling the surface roughness of the substrate to within applicants' claimed limitation.

However, Annacone et al. teach that substrates for recording media are required to have a very smooth surface finish of less than 10 Å inorder to allow extremely low flying heights and increased recording density (col. 3, lines 30 – 49 and col. 4, lines 42 – 46).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Lewis et al. in view of Sandstrom and Nakayama et al. to have a surface roughness meeting applicants' claimed limitations as taught by Annacone et al. inorder to allow extremely low flying heights and increased recording density.

Regarding claims 2 – 5 and 8, Lewis et al. disclose substrates inherently meeting applicants' claimed limitations, or their equivalents (e.g. ceramic and metal substrates are equivalent to glass substrates) (col. 2, lines 36 - 43).

Regarding claims 6, 7, 27 and 28, Lewis et al. disclose embossing the plastic film with surface features meeting applicants' claimed limitations (col. 13, lines 43 – 62 and Figures).

Regarding claim 9, in addition to the above disclosed limitations, the presently claimed property of relative head slap would have obviously been present because the prior art product is substantially the same structure, and there is no evidence of record showing that the disclosed prior art products do not necessarily possess the characteristics of the claimed product.

Regarding claim 14 - 17, Lewis et al. disclose resins meeting applicants' claimed limitations (col. 11, line 62 bridging col. 12, line 2). The limitation "at least partially ... resin" is a product-by-process limitation and is given little or no weight in terms of evaluating the prior art for the reason cited above.

Regarding claims 18, 22 - 25, Lewis et al. disclose thickness values meeting applicants' claimed limitations (col. 5, lines 30 - 40).

Regarding claim 21, it would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to minimize the tilt of the substrate, if not already inherently possessing said limitation, to meet applicants' claimed limitations as taught by Sandstrom inorder to allow for high density near field recording.

Regarding claims 26 - 28, Lewis et al. disclose embossed surface features meeting applicants' claimed limitations (col. 13, lines 43 - 62). The examiner has deemed that any embossed shape is inherently a "geographic locator" since it forms a pattern on the substrate which can be read either visually or mechanically.

17. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lewis et al. ('844) in view of Nakayama et al. ('602), Annacone et al. ('045) and Sandstrom ('461) as applied above (this combination of references hereafter referred to as LNAS), and further in view of IDS reference Wu et al. ('422).

LNAS disclose the claimed invention as described above.

LNAS fail to disclose a data layer meeting applicants' claimed limitations.

However, Wu et al. teach data layers meeting applicants' claimed limitations for use high areal recording density media (col. 1, lines 16 – 20 and Figures).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of LNAS to include a data layer meeting applicants' claimed limitations as taught by Wu et al. inorder to form a high areal recording density media.

18. Claims 13 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over LNAS as applied above, and further in view of IDS reference Napoli et al. ('155).

LNAS disclose the claimed invention as described above.

LNAS fail to disclose glass temperatures of the plastic film.

However, Nakayama et al. ('602) teach that the polymer film should have a glass temperature as high as possible inorder to have excellent mechanical and surface properties (col. 3, lines 15 – 34). Napoli et al. teach that typical embossing temperatures are up to 250 °C and beyond and that the polymer to be embossed must be capable of withstanding the processing temperatures (col. 2, lines 52 – 55). The higher the glass temperature of the polymer, the better the polymer will be able to withstand high temperature processing.

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of LNAS to include a plastic film possessing a glass temperature meeting applicants' claimed limitations as taught by Nakayama et al. and Napoli et al. inorder to produce a substrate capable of withstanding high processing temperatures as well as possessing excellent mechanical and surface properties.

19. Claim 30 is rejected under 35 U.S.C. 102(e) as anticipated by ***or, in the alternative***, under 35 U.S.C. 103(a) as obvious over Ishida et al. (U.S. Patent No. 6,347,016 B1).

Regarding claim 30, the claimed invention reads on Ishida et al. as follows: Ishida et al. disclose a storage media for data, said media comprising: a metal substrate, a plastic film (col. 22, lines 39 - 42), and a data layer disposed on said plastic film, wherein said data layer can be at least partly read from, written to, or a combination thereof by at least one energy field, wherein said energy field comprises at

least one of an electric field or a magnetic field (col. 1, lines 9 – 15 and col. 23, lines 4 - 21 and Figures).

In addition to the above disclosed limitations, the presently claimed property of the tilt measured in the resting state would have obviously been present because the prior art product is substantially identical in structure, and there is no evidence of record showing that the disclosed prior art products do not necessarily possess the characteristics of the claimed product.

20. Claims 1 – 11, 14 – 17, 20, 21, 24 – 26, 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishida et al. ('016) in view of IDS reference Annacone et al. ('045) and IDS reference Sandstrom ('461).

Regarding independent claims 1, 20, 32 and 33, Ishida et al. disclose the claimed invention as described above. Ishida et al. further disclose embossing the plastic film with geographic locators (col. 24, lines 35 - 42), optical or magnetic data layers (col. 30, lines 12 – 36), a glass substrate and a plastic film thickness meeting applicants' claimed limitations (col. 23, lines 4 – 13). The examiner has deemed that any embossed shape is inherently a "geographic locator" since it forms a pattern on the substrate which can be read either visually or mechanically.

Ishida et al. fail to disclose the tilt or the axial displacement of the substrate.

However, Sandstrom teaches that both tilt and axial displacement are undesired in a recording medium and that substrates possessing high flatness are known to be

desired in the recording industry to allow for high density near field recording systems (col. 3, lines 5 – 18; col. 3, line 64 bridging col. 4, line 14; and Figures 3 and 4).

Therefor, in addition to the above disclosed limitations, the presently claimed property of the tilt measured in the resting state would have obviously been present because the prior art product is substantially identical in structure, and there is no evidence of record showing that the disclosed prior art products do not necessarily possess the characteristics of the claimed product and it is known in the art to minimize the axial displacement and tilt as taught by Sandstrom inorder to allow for high density near field recording.

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Ishida et al., if not already inherently possessing said limitations, to possess a tilt and axial displacement meeting applicants' claimed limitations as taught by Sandstrom inorder to allow for high density near field recording.

None of the above disclose controlling the surface roughness of the substrate to within applicants' claimed limitation.

However, Annacone et al. teach that substrates for recording media are required to have a very smooth surface finish of less than 10 Å inorder to allow extremely low flying heights and increased recording density (col. 3, lines 30 – 49 and col. 4, lines 42 – 46).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Ishida et al. in view of Sandstrom to have a surface roughness meeting applicants' claimed limitations as taught by Annacone et al. inorder to allow extremely low flying heights and increased recording density.

Regarding claims 2 – 5 and 8, Ishida et al. disclose substrates inherently meeting applicants' claimed limitations, (e.g. ceramic and glass substrates) (col. 21, lines 13 - 15).

Regarding claims 6 and 7, Ishida et al. disclose embossing the plastic film with surface features meeting applicants' claimed limitations (col. 10, lines 4 – 9 and Figures).

Regarding claim 9, in addition to the above disclosed limitations, the presently claimed property of relative head slap would have obviously been present because the prior art product is substantially the same structure, and there is no evidence of record showing that the disclosed prior art products do not necessarily possess the characteristics of the claimed product.

Regarding claims 10 and 11, Ishida et al. disclose data layers possessing coercive force values meeting applicants' claimed limitations (col. 3, lines 25 – 35).

Regarding claim 14 - 17, Ishida et al. disclose resins meeting applicants' claimed limitations (col. 23, lines 4 - 13). The limitation "at least partially ... resin" is a product-by-process limitation and is given little or no weight in terms of evaluating the prior art for the reason cited above. While Ishida et al. fail to disclose whether the polyimide is a

thermoplastic polyimide or thermoset polyimide, the examiner deems that one of ordinary skill in the art would recognize that polyimides could be either and that whether it is a thermoplastic or thermoset merely controls whether it is cured or crosslinked.

Regarding claim 21, it would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to minimize the tilt of the substrate, if not already inherently possessing said limitation, to meet applicants' claimed limitations as taught by Sandstrom inorder to allow for high density near field recording.

Regarding claims 24 and 25, Ishida et al. disclose thickness values meeting applicants' claimed limitations (col. 23, lines 4 - 13).

Regarding claims 26, Ishida et al. disclose embossed surface features meeting applicants' claimed limitations (col. 24, lines 35 – 42 and Figures). The examiner has deemed that any embossed shape is inherently a "geographic locator" since it forms a pattern on the substrate which can be read either visually or mechanically.

21. Claims 13 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishida et al. in view of Annacone et al. and Sandstrom as applied above (this combination of references hereafter referred to as IAS), and further in view of IDS reference Nakayama et al. ('602) and IDS reference Napoli et al. ('155).

IAS disclose the claimed invention as described above.

IAS fail to disclose glass temperatures of the plastic film.

However, Nakayama et al. ('602) teach that the polymer film should have a glass temperature as high as possible inorder to have excellent mechanical and surface

properties (col. 3, lines 15 – 34). Napoli et al. teach that typical embossing temperatures are up to 250 °C and beyond and that the polymer to be embossed must be capable of withstanding the processing temperatures (col. 2, lines 52 – 55). The higher the glass temperature of the polymer, the better the polymer will be able to withstand high temperature processing.

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of IAS to include a plastic film possessing a glass temperature meeting applicants' claimed limitations as taught by Nakayama et al. and Napoli et al. inorder to produce a substrate capable of withstanding high processing temperatures as well as possessing excellent mechanical and surface properties.

22. Claims 18, 22, 23, 27, 28 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over IAS as applied above, and further in view of Oniki et al. ('083).

IAS disclose the claimed invention as described above.

IAS fail to disclose substrate and overall media thickness values meeting applicants' claimed limitations (claims 18, 22, 23 and 31) and the depth of the embossed surface features meeting applicants' claimed limitations (claims 27 and 28).

However, the substrate thickness, the overall thickness and the depth of the embossed surface features are cause-effective variables which can be optimized to control the physical (stiffness, mass, etc.) and mechanical (surface roughness, servo-tracking ability, etc.) properties of the substrate. Oniki et al. teach substrate thickness

values fully encompassing applicants' claimed range for total medium thickness and substrate thickness (col. 3, lines 63 – 67) and Oniki et al. also disclose depths meeting applicants' claimed limitations (Figure 8 and col. 6, lines 36 – 44 and lines 53 – 59).

It would have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the substrate + plastic layer thickness, the overall medium thickness and the depth of the embossed surface features through routine experimentation in the absence of a showing of criticality in the claimed thickness values and embossed surface feature depth, especially given the teachings in Oniki et al. regarding the ranges useable for these variables. *In re Boesch*, 205 USPQ 215 (CCPA 1980), *In re Woodruff*, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

23. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over IAS as applied above, and further in view of IDS reference Lacotte et al. ('407).

IAS disclose the claimed invention as described above.

IAS fail to disclose a double sided recording medium

However, Lacotte et al. teach that it is old in the art to make single or double sided media depending on the desired end use (i.e. for twice the recording density) (col. 1, line 29).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of IAS to include a double sided

recording media as taught by Lacotte et al. inorder to produce a medium possessing twice the recording density.

Examiner's Comments

24. In view of the extensive prior art that directly applies to applicants' invention (as exemplified by the rejections above and the prior art cited below), the examiner felt obliged to apply multiple rejections to the current claims. Due to the large number of references cited, the examiner recommends consideration by applicants as to which features of the disclosed invention applicants believe are critical to producing the improvement(s) over the cited prior art.

From the specification, it appears that applicants' invention has two main embodiments which rely on a combination of material properties of the storage disk media substrate. One embodiment appears to be a composite substrate with a damping material either mixed in, or structured with, the substrate, followed by embossing the substrate. The other embodiment is a coated composite substrate wherein the coating is embossed. As pointed out in the prior art rejections of record, it is known to have a rigid metal or glass core with an embossable polymeric coating.

If applicants' invention is directed to an unexpected improvement when a property, or combination of properties, are optimized, claims directed to these properties should be considered. For example, Figures 5 and 7 shows the effect of damping coefficient and stiffness on the axial displacement, while Figure 6 shows how the damping coefficient does not effect the first modal frequency. However, the examiners

concern is that the optimization of a ***known*** results effective property is not a patentable feature unless such optimization would produce an unexpected benefit or would be a non-trivial optimization. The examiner also reminds applicants that a property which is a function of a spin rate or an interaction with a magnetic head would not confer patentability to the article, but may confer patentability to a method of use if an unexpected improvement over the prior art is noted.

Applicants mention in paragraph 0037 that the damping coefficient unexpectedly offsets the decreased stiffness of a plastic substrate, however the examiner notes the many references of record that refer to vibration damping in storage media and remains unconvinced of the unexpected nature of such an effect. Similarly, applicants recite the unexpected nature of the head slap resistance when using a coating layer of a certain thickness in paragraph 0084. Again, the examiner is not convinced that these results would be unexpected to one of ordinary skill in the art since most polymers are known to have a low hardness relative to NiP and are better at absorption of impact energy than metals. However, it appears that the head slap characteristics would be a known results effective property depending on the thickness of the coating layer and that there is no evidence of record showing an unexpected improvement in head slap characteristics based on the coating material or thickness.

Finally, the examiner notes that paragraph 0092 discloses that the axial displacement is apparently dependent on the first modal frequency, but there is no evidence of record as to whether the axial displacement determines the modal frequency, if the modal frequency determines the axial displacement, or both (i.e. a one-

to-one relationship). Applicants also disclose that both the displacement and frequency can be adjusted by changing the core/skin ratio and other material properties of the substrate.

In view of the extensive art of record and applicants' current disclosure, the examiner recommends consideration of which structure, materials or properties best exemplify the improvements seen by applicants. One of ordinary skill in the art possesses the knowledge that a rigid core may be coated with a polymeric material and then embossed, as well as the rudimentary knowledge that many properties effect the performance of a storage disk, from warp, axial displacement, head slap characteristics, surface roughness, modulus, density, servo frequency and resonance frequencies.

Conclusion

25. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Nishizawa et al. (IDS – 5,078,947): teach selecting polycarbonate or polyetherimide as the plastic layer since good UV absorbers
- Bonnebat et al. (IDS – 4,987,020): teach desired properties (warp, modulus, density, etc).
- de Graaf et al. (IDS – 5,188,863): teach selection of opaque or transparent substrates depending on how data is to be read.
- Hirata et al. (IDS – 6,127,017): teach servo heights for magnetic or optical media, as well as equivalents of PEI and PES to polycarbonate and phenols.

- Zou et al. (5,981,015): teach method of selection of substrate considering deflection, modulus, thickness, warp and surface roughness.
- Kuromiya et al. (5,585,989): teach controlling the first modal frequency to avoid the servo band.
- Czubarrow et al. (6,030,681): teach size, head-slap, GPa, warp and other properties.
- Stanish et al. (5,948,495): teach head distance, wobble, modulus, density, thickness for magnetic disk substrates.
- Miyake et al. (5,585,159): teach resonance frequencies and what properties influence it.
- Hartog et al. (6,236,542 B1): teach the ability to polish substrates to very low surface roughness values (~ 1 Å).
- Otada et al. (JP 06-3205817 A): JPO abstract teach PEI coated ceramic substrates for controlling smoothness and weight.
- Landin et al. (5,538,774): teach that PC, PEI and polysulfones are known damping materials that will affect the resonance frequency of the medium.

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (703) 308-1737. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on (703) 308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are (703)

872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0651.

KMB
May 23, 2002

STEVAN A. RESAN
PRIMARY EXAMINER